Maryland School Assessment

Science

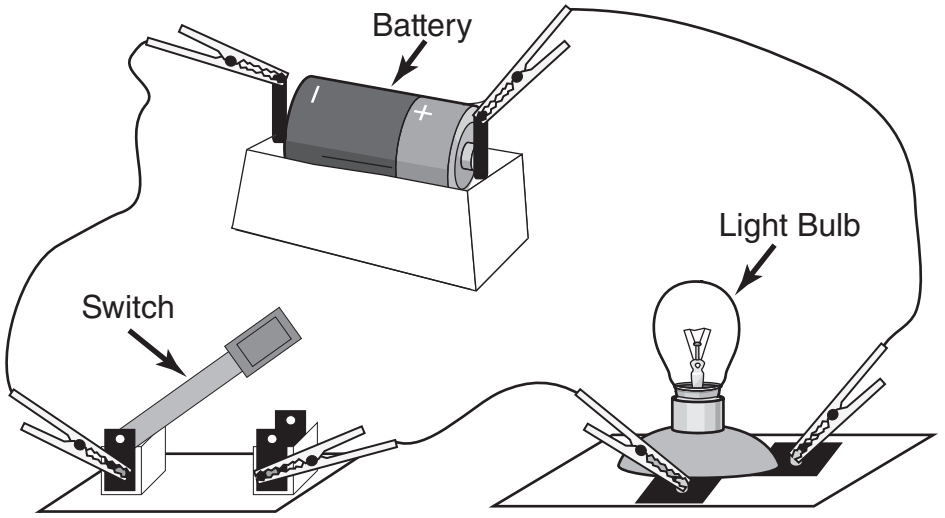
2013 Public Release

Grade 5

Part 1

Part 1

1 **Four students made the electric circuit shown below. Each student then tried to explain why the light bulb did not glow.**



Student	Explanation
1	The battery is dead.
2	A wire is broken.
3	The switch is open.
4	The light bulb is broken.

Which student best explained why the light bulb did not glow?

○ **A** Student 1

○ **B** Student 2

○ **C** Student 3

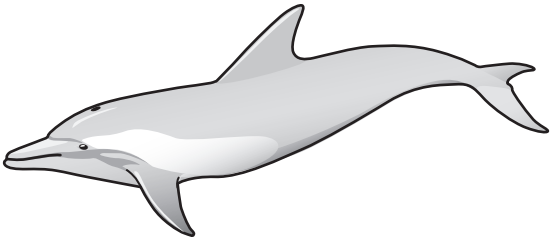
○ **D** Student 4

Part 1

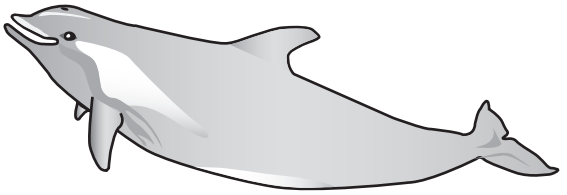
Directions

Use the information below to answer Numbers 2 through 4.

Dolphins that are found in oceans live either near coastlines or in deeper waters offshore. Dolphins that live near a coastline have larger flippers and smaller bodies than dolphins that live in deeper waters.



Dolphins That Live Near Coastline



Dolphins That Live in Deeper Water

Part 1

2 **Dolphins use food to**

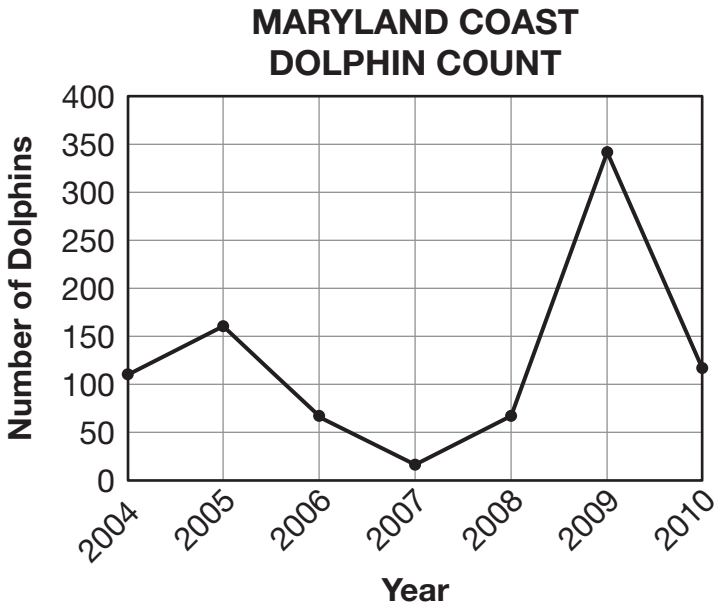
- ○ **A** find mates
- ○ **B** locate shelter
- ○ **C** obtain energy
- ○ **D** eliminate waste

3 **The larger body helps the offshore dolphins survive because they**

- ○ **A** swim faster than predators
- ○ **B** swim closer to the surface of the water
- ○ **C** can migrate shorter distances to find mates
- ○ **D** can dive deeper into colder water to find food

Part 1

4 **Dolphins that live near the Maryland coastline are often observed in water temperatures between 10° Celsius and 32° Celsius. The number of dolphins counted during several years is shown in the graph below.**



Which year most likely had temperatures between 10° Celsius and 32° Celsius for the longest amount of time?

- ○ **A** 2004
- ○ **B** 2005
- ○ **C** 2009
- ○ **D** 2010

Part 1

5 **Pollutants, such as motor oil and gasoline, are sometimes leaked onto roads by vehicles.**

How do these pollutants most likely affect the environment?

- ○ **A** Storms wash the pollutants into lakes and rivers.
- ○ **B** Animals become sick from licking the pollutants on the road.
- ○ **C** Animals get stuck in the pollutants when they cross the road.
- ○ **D** Winds blow the pollutants to the side of the road and harm the soil.

6 **A student throws a ball into the air. While the ball travels up, the speed of the ball decreases.**

What force causes the ball to slow while traveling up?

- ○ **A** electricity
- ○ **B** gravity
- ○ **C** magnetism
- ○ **D** tension

Part 1

7 **Three students each threw the same ball straight up into the air at different times. The greatest height that the ball reached for each student is shown in the table below.**

HEIGHTS OF THROWN BALL

Student	Greatest Height (meters)
1	9.2
2	8.0
3	7.5

Explain why the ball reached a different height for each student. In your explanation, be sure to include

- **the forces acting on the ball**
- **other factors that may affect the results**

Part 1

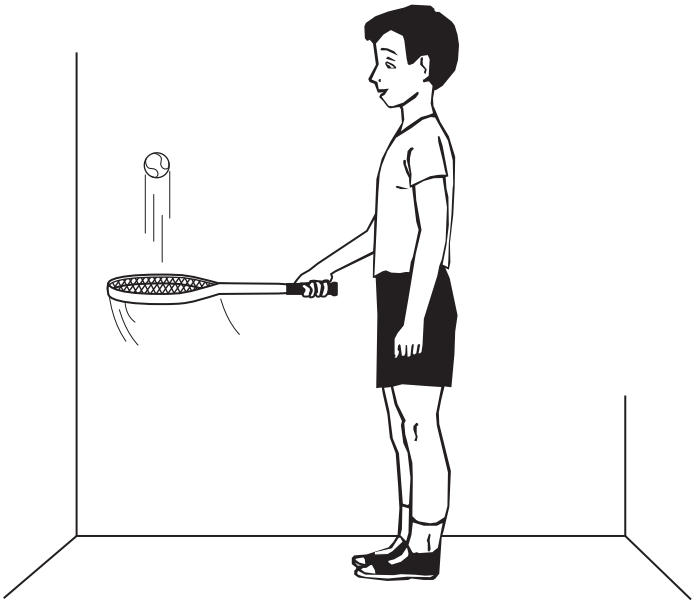
Write your answer in the space provided.

Part 1

Directions

Use the information below to answer Numbers 8 through 10.

A tennis player hit a tennis ball into the air, giving the ball a speed of 30 meters per second. The data table below shows the time the ball was in the air and the speed of the ball as it went up and down.



Time (seconds)	Speed of the Ball (meters per second)
0 (ball is hit up)	30
1	20
2	10
3	0
4	10
5	20
6	30

Part 1

8 **In what direction does the force of gravity act on the ball?**

- ○ **A** upward
- ○ **B** downward
- ○ **C** toward the left
- ○ **D** toward the right

9 **What best describes the speed of the ball from 0 seconds to 6 seconds?**

- ○ **A** It increases.
- ○ **B** It decreases.
- ○ **C** It decreases, then increases.
- ○ **D** It increases, then decreases.

10 **The student hits the ball a second time, but twice as hard.**

Which statement best describes what happens to the ball?

- ○ **A** Gravity acts on the ball half as much.
- ○ **B** Gravity acts on the ball twice as much.
- ○ **C** The ball travels half as high in 3 seconds.
- ○ **D** The ball travels twice as high in 3 seconds.

Part 1

11 **A container of liquid water was placed outside during the day when the temperature was 3°C. At night the outside temperature dropped to −2°C.**

This temperature change most likely caused the water to

- ○ **A** condense
- ○ **B** evaporate
- ○ **C** remain a liquid
- ○ **D** become a solid

12 **A large rock breaks into small pieces within 10 years.**

Which process is most likely responsible for breaking the large rock into small pieces within 10 years?

- ○ **A** steady winds blowing throughout the years
- ○ **B** gentle rain falling during each spring and fall
- ○ **C** lack of rain falling during a four-year drought
- ○ **D** water repeatedly freezing and thawing in a crack

Part 2

Part 2

Directions

Use the information below to answer Numbers 13 and 14.

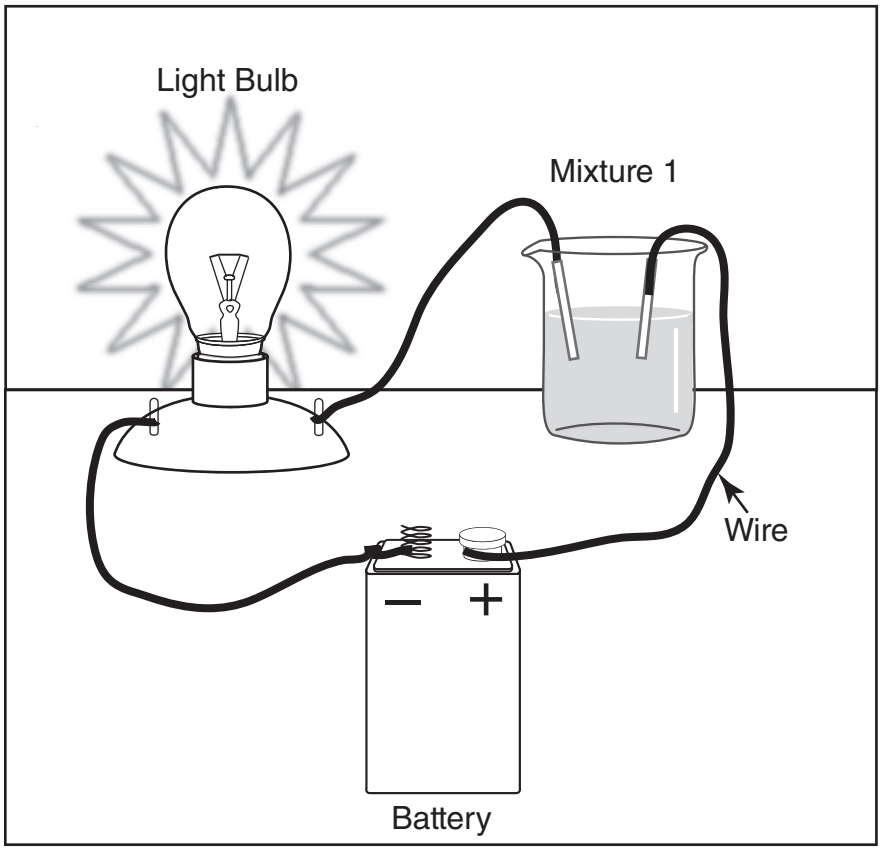
A teacher gave students two mixtures. Each mixture was made of two materials. The teacher asked the students to investigate the properties of the mixtures and to separate the materials in each mixture. The teacher provided the data table below.

MIXTURE INFORMATION

Mixture	Known Material	Unknown Material	Mixture Description
1	Water	X	Clear liquid
2	Iron filings	Z	Solid gray and white particles

Part 2

13 **The teacher set up an investigation using three wires, a light bulb, a battery, and Mixture 1 as shown below. When the teacher connected the wires to the battery, the light bulb glowed.**



Mixture 1 is <u>best</u> described as

○ **A** strong

○ **B** magnetic

○ **C** heat conductor

○ **D** electricity conductor

Part 2

14 **The students heated Mixture 1 on a hot plate.**

What happened to the water as Mixture 1 was heated?

- ○ **A** The water condensed.
- ○ **B** The water evaporated.
- ○ **C** The water became a solid.
- ○ **D** The water became a liquid.

Part 2

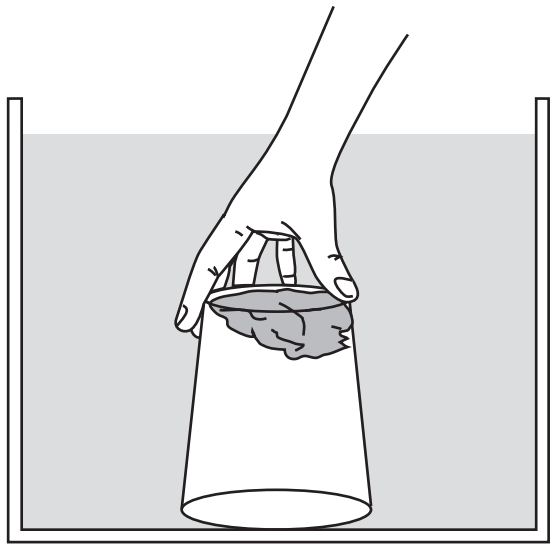
15 **Water cycles through three states of matter on Earth.**

What has the greatest effect on the state of matter of water?

- ○ **A** tides
- ○ **B** gravity
- ○ **C** the sun
- ○ **D** the moon

Part 2

16 **A student crumpled a dry paper towel and taped it to the bottom of the inside of a cup. Then, the student pushed the cup upside down into a pan of water. When the student removed the cup from the water, the paper towel was still dry.**



Which statement best explains why the paper towel remained dry?

- ○ **A** The cup was made of plastic.
- ○ **B** The paper towel has a certain mass.
- ○ **C** The paper towel has a certain volume.
- ○ **D** The cup contained air with the paper towel.

Part 2

Directions

Use the passage below to answer Numbers 17 through 19.

How Do You Keep a Whole Planet Warm?

Light from the sun warms land, water, and air. In turn, the warmed-up land, water, and air give off heat, which rises up toward the sky. Gases in the Earth's atmosphere capture some of that heat and prevent it from escaping into space. This heat trap keeps the ground, oceans, and air at fairly stable, predictable[1] temperatures—warm enough to allow thousands of plant and animal species (including humans, like us) to thrive.

Without heat trapping, the Earth's surface would be about 60 degrees Fahrenheit colder than it is now. If you're living in a place like Wisconsin, that means you'd have to wear boots and a heavy coat in July. BRRRRR! (We won't even talk about January!) The Earth's overall temperature has changed often across the eras—the long periods of time we use to measure the Earth's age. We know this because paleontologists[2] have studied the fossils of plants and animals, and because geologists[3] can read the Earth's history in rocks and soil. In hotter eras, dinosaurs clomped across warm green landscapes filled with plants. In colder eras, the wooly mammoth survived in rugged terrain of ice and snow.

For the past 10,000 years, the Earth has had relatively stable temperatures. But, for the past 100 years or so, scientists have noticed the Earth seems to be warming up more than usual. This phenomenon[4] is called global warming.

[1]**predictable** – expected
[2]**paleontologists** – scientists who study prehistoric times
[3]**geologists** – scientists who study rocks
[4]**phenomenon** – something that can be observed

Part 2

17 **Much of the heat energy from the sun does not return to space, making life on Earth possible.**

Which property of Earth prevents the return of heat energy from the sun to space?

- ○ **A** the presence of an atmosphere
- ○ **B** the presence of magnetic poles
- ○ **C** the location of land masses on Earth
- ○ **D** the location of Earth in the solar system

18 **What information do scientists learn from dinosaur and wooly mammoth fossils?**

- ○ **A** the age of Earth
- ○ **B** how rocks are formed
- ○ **C** the age of the solar system
- ○ **D** past environmental conditions

19 **Energy from the sun warms Earth.**

The sun is classified as

- ○ **A** the closest star to Earth
- ○ **B** the closest moon to Earth
- ○ **C** the farthest planet from Earth
- ○ **D** the farthest satellite from Earth

Part 2

20 **The estimated amounts of water that humans use for various activities are shown in the table below.**

WATER USE

Activity	Estimated Amount of Water Used (liters)
Taking a shower	100
Taking a bath	160
Brushing teeth (water running)	8
Running a dishwasher	60
Washing one load of laundry	120
Getting a drink of cold water (water running)	4

Explain how the information in the table might be used to save water. In your explanation, be sure to include

- **data from the table**

Part 2

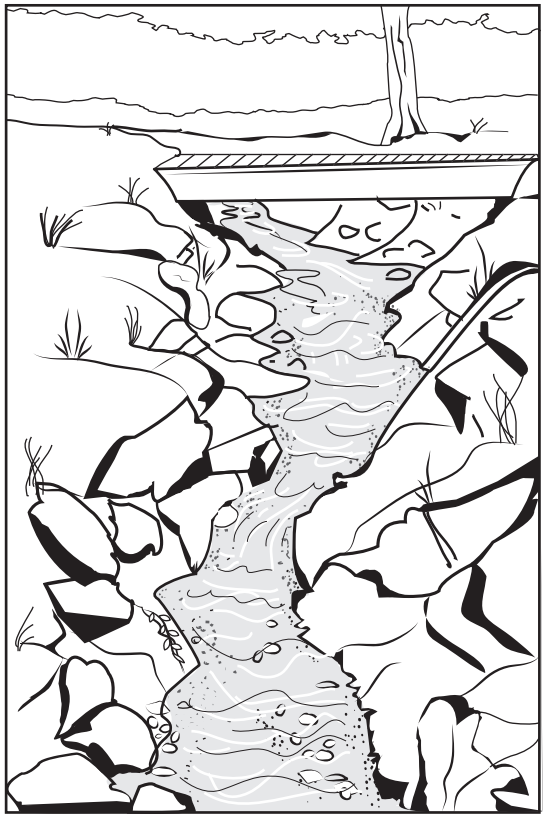
Write your answer in the space provided.

Part 2

Directions

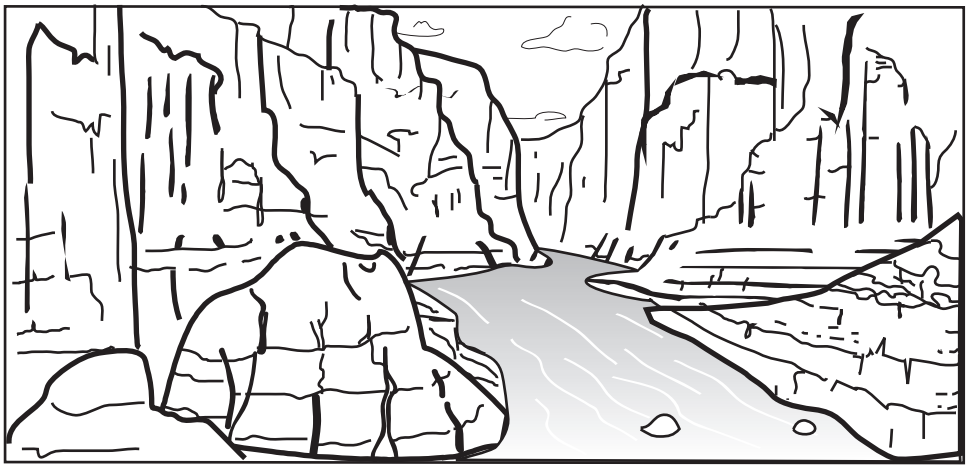
Use the information below to answer Numbers 21 and 22.

Students observed a creek during a field trip to a local nature center. A nature center guide explained that natural processes had formed the creek and reshaped the surface of Earth along the creek.



Part 2

21 **Students compared their observations of the creek with the diagram of the Grand Canyon below.**

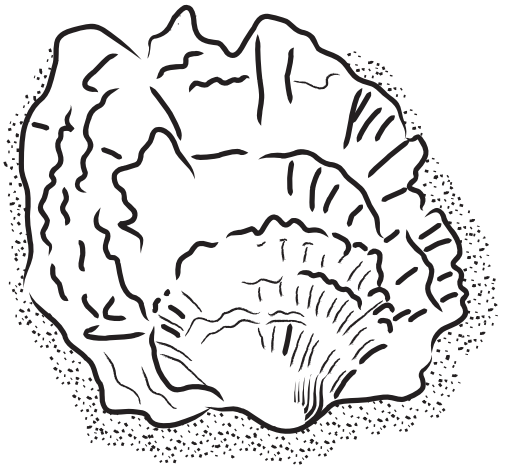


Which process <u>best</u> describes how the Grand Canyon was formed?

- ○ **A** fast erosion by wind
- ○ **B** fast weathering by wind
- ○ **C** slow erosion by moving water
- ○ **D** slow weathering by moving water

Part 2

22 **The students observed a fossil in a layer of rock by the creek. The fossil was the shell of a giant oyster that once lived in salt water.**



Giant Oyster Shell

The giant oyster fossil was found near the creek because many years ago

○ **A** the giant oyster moved onto the land around the creek

○ **B** a storm moved the fossil from the ocean to the creek

○ **C** the water flowed from the ocean to the creek

○ **D** the land around the creek was under water

Part 2

23 **Human activities affect the natural environment in many ways.**

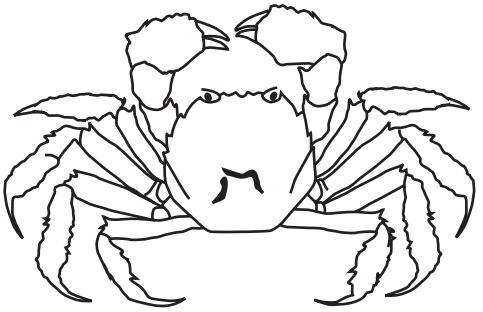
Which action would have a positive effect on the natural environment?

- ○ **A** using natural gas to heat homes
- ○ **B** building dams to produce electricity
- ○ **C** cutting down trees to build new homes
- ○ **D** recycling paper to reduce the cutting of trees

Part 3

Part 3

24 **The Chinese mitten crab is a species of crab brought to the United States accidentally. The crabs bother watermen by tearing nets.**



What other behavior of the Chinese mitten crab also causes trouble for local watermen?

- ○ **A** The crabs swim very fast.
- ○ **B** The crabs reproduce slowly.
- ○ **C** The crabs live for many years.
- ○ **D** The crabs eat large amounts of shrimp.

Part 3

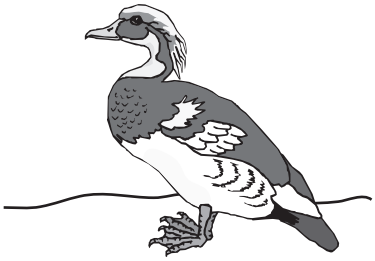
Directions

Use the information and the diagram below to answer Numbers 25 and 26.

Birds of Maryland

Scientists have identified more than 400 species of birds that live in Maryland. These birds are found in different habitats, such as cities, forests, and near ocean shores. During a class project, students studied the six species of birds shown below.

SIX BIRDS OF MARYLAND

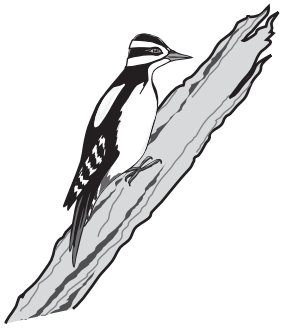


Wood Duck

Barn Owl

Ruby-Throated Hummingbird

Bald Eagle



Downy Woodpecker

Cardinal

Part 3

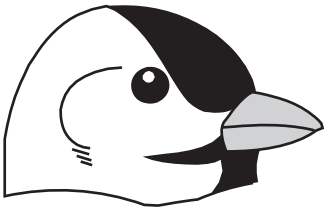
25 **Cardinals use their beaks to crack open seeds.**

Which of the birds pictured below <u>most likely</u> eats the same type of food as a cardinal?

○ **A**

Kingfisher

○ **B**



Goldfinch

○ **C**

Barn Owl

○ **D**

Canada Goose

Part 3

26 **Over time, a woodland pond filled with sediment. The habitats and food sources of four different birds are shown in the table below.**

HABITATS AND FOOD SOURCES OF FOUR BIRDS

Bird Type	Habitat	Food Source
Barn owl	Grasslands, farmlands, woodlands	Rats, mice, rabbits
Cardinal	Woodland edges, meadows	Seeds, grains
Bald eagle	Woodlands, large lakes, rivers	Fish, rabbits, small birds
Wood duck	Lakes, streams, swamps, woodlands	Snails, insects, water plants

Which bird would <u>most likely</u> need to find a similar habitat in a new location after the pond fills with sediment?

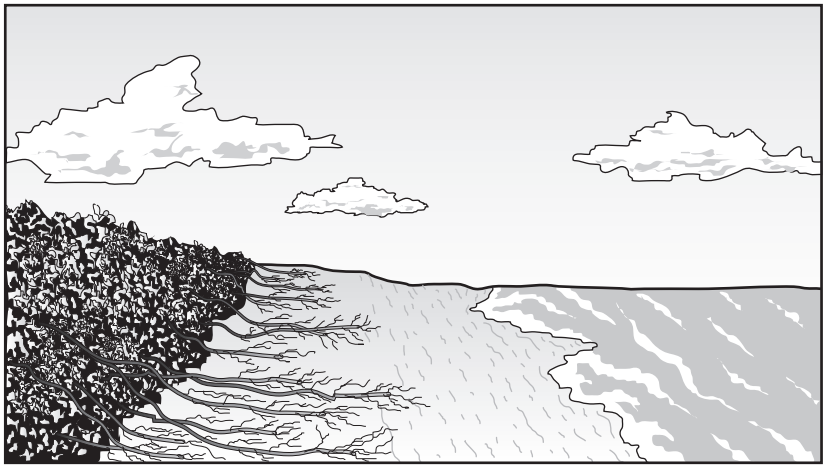
- ○ **A** the barn owl
- ○ **B** the cardinal
- ○ **C** the bald eagle
- ○ **D** the wood duck

Part 3

Directions

Use the passage below to answer Numbers 27 through 30.

Invasion of the Vines: A Fine Solution Creates a Vine Problem



Along the beaches of North Carolina and South Carolina, a harmless-looking vine is stirring up a surprising amount of trouble. At first glance, beach vitex does not appear to be a problematic plant. It has grayish green leaves all year round and lush purple flowers in the spring. It smells spicy. This climbing plant used to be welcome wherever it grew.

In the mid-1980s, scientists brought beach vitex, *Vitex rotundifolia*, from Korea to the United States. They hoped the plant would keep beach sand from blowing away. Beach vitex, which grows wild on ocean beaches in Korea, seemed like the perfect plant for the Carolina beaches. People thought its sprawling roots would stabilize the sand, and it didn't mind salty water, or even being dried out completely. Beach vitex was for sale in greenhouses throughout the Carolinas, so that people from the area could buy it and plant it themselves.

Part 3

But the alarming trouble with beach vitex is that it grows too quickly, at least in the Carolinas. It tends to crowd out the slower-growing native plants. A beach vitex plant just sprouting at the beginning of summer is a sprawling plant by summer's end. The vines send out long runners, which are stems of the plant that snake out along the ground. These runners root into the sand, forming a dense mat of branches that extends outward in all directions.

Scientists are alarmed because they would like the natural plants that have grown on the Carolina coasts to continue to be there for years to come. The way plants and animals work together is very complicated. When native plants grow well, the birds, insects, and other animals that have learned to get along with these plants can continue to build their homes, raise young, and prosper.[1]

The people who brought the beach vitex to the Carolinas thought they were solving a problem. But they did not know that beach vitex would grow so well in its new environment. Even today, people are not entirely certain that the plant keeps the sand in place, as it does in Korea. What they are sure of is that beach vitex is killing other plants.

[1]**prosper** – do well, grow

27 **Planting beach vitex has a negative consequence on beaches by**

- ○ **A** increasing growth toward the ocean
- ○ **B** decreasing the habitat of native plants
- ○ **C** increasing habitats for beach organisms
- ○ **D** decreasing the amount of sand blowing away

Part 3

28 **Which feature of beach vitex most likely enables it to survive and grow near the ocean?**

- ○ **A** spicy smell
- ○ **B** purple flowers
- ○ **C** ability to grow in salty soil
- ○ **D** ability to grow leaves all year

29 **The environmental factor that most likely caused people to plant beach vitex along the coast of the Carolinas was**

- ○ **A** summer temperature
- ○ **B** thunder storms
- ○ **C** sand erosion
- ○ **D** water quality

Part 3

30 **Explain how introducing beach vitex from Korea to the Carolinas affected organisms on the Carolina coast. In your explanation, be sure to include**

- **beneficial effects**
- **harmful effects**

Write your answer in the space provided.

Part 3

Directions

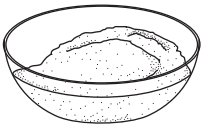
Use the information below to answer Numbers 31 and 32.

Students in a lab investigated samples of different forms of matter.

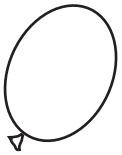
Pieces of Paper

Shiny Metal Nails

Clear Liquid in a Bowl



Solid White Crystals in a Bowl



Balloon Filled with Air

Part 3

31 **The total mass of the whole piece of paper compared to the total mass of the small pieces of paper**

- ○ **A** decreased because some pieces of paper were lost
- ○ **B** increased because there were more pieces of paper
- ○ **C** decreased because each piece of paper was smaller than the whole piece of paper
- ○ **D** remained the same because the mass of the small pieces equals the mass of the whole piece of paper

32 **Which statement about the samples shows that all matter takes up space?**

- ○ **A** The liquid was clear.
- ○ **B** The nails were shiny.
- ○ **C** The air filled the balloon.
- ○ **D** The pieces of paper were white.

Part 3

33 **Beach pollution includes sewage, paper and plastic containers, and oil from boats.**

Which beach activity most likely increases beach pollution?

- ○ **A** watching birds
- ○ **B** collecting seashells
- ○ **C** eating a picnic lunch
- ○ **D** building a sand castle

Part 3

34 **Metals have many useful properties. The table below compares five properties of metals.**

PROPERTIES OF NICKEL, IRON, CALCIUM, AND COPPER

Types of Metals	Conducts Electricity	Conducts Heat	Magnetic	Hardness	Flexible
Nickel	Well	Well	Yes	Hard	Yes
Iron	Well	Well	Yes	Hard	No
Calcium	Very well	No	No	Soft	No
Copper	Very well	Very well	No	Hard	Yes

Which metal would be best for flexible wire that conducts electricity?

○ **A** nickel

○ **B** iron

○ **C** calcium

○ **D** copper

Part 3

35 **A student used the information from the table below to identify an unknown mineral.**

PROPERTIES OF TWO MINERALS

Mineral	Color	Streak	Hardness	Luster
Graphite	Steel gray	Black	1–2	Metallic
Hematite	Steel gray	Red brown	5–6	Metallic or nonmetallic

Which properties would <u>best</u> determine the identity of the mineral?

- ○ **A** color and luster
- ○ **B** color and streak
- ○ **C** hardness and luster
- ○ **D** streak and hardness

STOP

Part 4

STOP

Part 4

36 **Many types of motion occur in our solar system.**

Which type of motion describes one Earth year?

- ○ **A** the revolution of the sun around Earth
- ○ **B** the revolution of Earth around the sun
- ○ **C** the rotation of the sun around Earth
- ○ **D** the rotation of Earth around the sun

Part 4

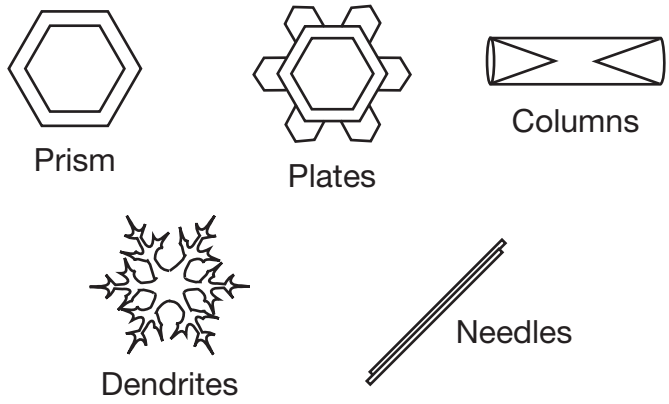
Directions

Use the information and diagrams below to answer Numbers 37 through 39.

Snowflake Chemistry

Environmental factors determine the shape of a snowflake. Three environmental factors are dirt particles in the air, the temperature of the air, and the height of a snowflake in the atmosphere when the snowflake forms. Evidence shows that when the air around a snowflake is very cold, the tips of the snowflake are very sharp.

COMMON SNOWFLAKE SHAPES



Part 4

37 **To become a snowflake, a drop of water in a lake**

- ○ **A** condenses → freezes → evaporates
- ○ **B** freezes → precipitates → evaporates
- ○ **C** precipitates → freezes → condenses
- ○ **D** evaporates → condenses → freezes

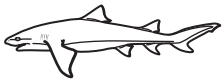
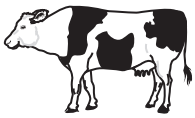
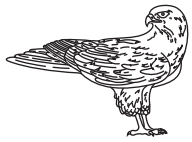
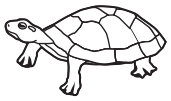
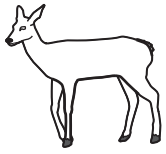
38 **Snow is an important part of the water cycle on Earth because snow**

- ○ **A** stores fresh water
- ○ **B** keeps the ground cold
- ○ **C** may form when clouds are not present
- ○ **D** melts when temperatures are above 0°C

39 **Compared with a handful of snow, an ice cube**

- ○ **A** is attracted by magnets
- ○ **B** conducts electricity
- ○ **C** conducts heat
- ○ **D** is harder

40 **Students sorted animals into four groups. The students were given an additional animal to classify. This animal has feathers, a beak, and lays eggs. However, it cannot fly and does not hunt or eat other animals.**

Group 1	Group 2	Group 3	Group 4
 Shark	 Cow	 Hawk	 Turtle
 Tuna	 Deer	 Owl	 Snake
 Salmon	 Moose	 Eagle	 Lizard

Into which group would the animal <u>best</u> be placed?

○ **A** Group 1

○ **B** Group 2

○ **C** Group 3

○ **D** Group 4

Part 4

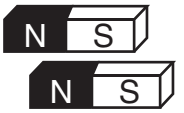
Directions

Use the information below to answer Numbers 41 through 43.

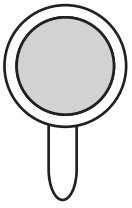
A science class is studying physical science. The students are using the following materials:

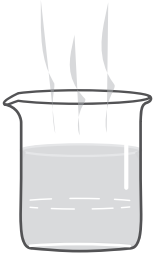

Iron Nail


Copper Wire



2 Bar Magnets


Plane Mirror


Beaker of Hot Water


Glass Spoon


Plastic Spoon


Steel Spoon


Wooden Spoon

Part 4

41 **A student stands in front of the plane mirror.**

Which statement describes the image of the student in the mirror?

- ○ **A** The image is reversed left to right.
- ○ **B** The image is reversed top to bottom.
- ○ **C** The image is bigger than the actual student.
- ○ **D** The image is smaller than the actual student.

42 **Which object is a poor conductor of heat?**

- ○ **A** iron nail
- ○ **B** copper wire
- ○ **C** steel spoon
- ○ **D** wooden spoon

43 **Which object is attracted by a magnet?**

- ○ **A** steel spoon
- ○ **B** glass spoon
- ○ **C** plastic spoon
- ○ **D** wooden spoon

Part 4

44 **A ship leaks a large amount of oil near a coastal area.**

Which statement describes how the oil most likely will affect the coastal habitat?

- ○ **A** Fish reproduction rates will increase.
- ○ **B** Water birds will be unable to use their wings.
- ○ **C** Water plants will be exposed to more sunlight.
- ○ **D** Coastal plants will have access to more nutrients.

45 **The times the sun rises and sets on the same day in three regions of Maryland are recorded in the data table below.**

DAYLIGHT IN MARYLAND

Regions of Maryland	Sunrise	Sunset
Western	5:42 A.M.	8:39 P.M.
Central	5:39 A.M.	8:33 P.M.
Eastern	5:36 A.M.	8:25 P.M.

Which of the following statements is an accurate conclusion based on the information in the data table?

○ **A** The sun rises earliest in Eastern Maryland; the sun sets latest in Eastern Maryland.

○ **B** The sun rises earliest in Western Maryland; the sun sets latest in Eastern Maryland.

○ **C** The sun rises earliest in Eastern Maryland; the sun sets latest in Western Maryland.

○ **D** The sun rises earliest in Western Maryland; the sun sets latest in Western Maryland.

Part 4

46 **The Piedmont and Coastal Plains regions in Maryland produce crops such as corn, soybeans, wheat, tobacco, tomatoes, and apples.**

Which environmental factor most likely influences which crops are grown in these regions?

- ○ **A** soil quality
- ○ **B** wind speeds
- ○ **C** bird migration
- ○ **D** water temperature

Acknowledgements

"How Do You Keep a Whole Planet Warm?" From EEK! Environmental Education for Kids (www.dnr.wi.gov/eek) Wisconsin Department of Natural Resources, 2007.

"Invasion of the Vines" by Kathleen Angione, MUSE, July/August 2006